

SABROE® CAFP CO₂/NH₃ low-temperature chiller

Compact packaged freezer systems using reciprocating compressors, and CO₂/NH₃ as refrigerant, with a 100–800 kW capacity range

The highly customised SABROE® CAFP freezer systems are based on a cascade system that combines the advantages of CO₂ on the low-temperature side and ammonia on the high-temperature side.

These packaged systems are built around SABROE reciprocating compressors that use CO₂ as refrigerant, which gives them a significantly greater cooling capacity than corresponding compressors using ammonia. This in turn makes the low-temperature compressor much smaller, and the whole package significantly more compact than traditional two-stage ammonia-based freezer systems.

As a result, each standard CAFP package can be fitted inside a standard 20-foot shipping container, if required. This does away with the need for a special machinery space, and the freezer installation can easily be moved if required.

Compared with conventional ammonia-based two-stage or single-stage systems with economisers, a CAFP unit uses significantly less power in the temperature range down to –55°C.

This results in energy savings of as much as 15% compared with traditional two-stage ammonia systems, and up to 45% compared with single-stage set-ups.



CAFP unit controlled and monitored by UniSAB systems controller

Advantages	Benefits
Compact design that fits inside a standard 20-foot container	Big savings on installation costs
High COP and extremely low power consumption, even at part load	Low operating costs
Use of CO ₂ as low-temperature refrigerant reduces piping complexity and costs	Reduces installation costs
Very small ammonia charge, located on the unit itself	No risk of ammonia leaks in production areas, cold stores and working areas
CO ₂ is a simple, inexpensive natural refrigerant	Low operating costs

Range

There are six standard models in this range of freezer systems, with capacities ranging from 100 kW to 800 kW.

All CAFP units are operationally tested with refrigerant before dispatch. Factory acceptance test (FAT) available.

Standard equipment

- Double control panel including UniSAB systems controller
- CO₂ pump separator including two pumps (one standby)
- Shell-and-tube cascade cooler with double-tube sheet to minimise any risk of CO₂ and ammonia mixing
- Standstill cooling unit, with separate control panel and power supply, to limit CO₂ pressure
- Automatic oil recovery system in both circuits
- Water-cooled condenser (plate heat exchanger type) on ammonia side
- Insulation of all cold parts.

Options

- Variable-speed drive
- Titanium plates in condenser
- Oversized CO₂ pump separator for high CO₂ evaporator volume
- Oversized CO₂ pumps for higher circulation rate
- Oversized ammonia condenser for higher cooling water temperature
- Fully welded shell-and-tube cascade cooler
- External interstage load, including a brine cooler on the R717 side of the cascade cooler
- Special version for use with remote condenser
- Configurations for use with HCFC refrigerants instead of ammonia on high-pressure side.

Compliance

All SABROE® chiller units are fully compliant with appropriate major international design codes and the specifications laid down by the most common classification societies.

Approval in accordance with other technical requirements, specific national legislation or other classification societies' requirements is available on request.

Model	Evaporation temperature °C	Capacity kW	Power consumption kW	Compressors R744/R717	Minimum NH ₃ charge kg (approx.)	Minimum CO ₂ charge l (approx.)	Unit dimensions in mm (approx.) L x W x H	Weight (approx.) kg	Sound pressure level dB(A)
CAFP 80	-50	87	64	HPO 24 / SMC 104 S	120	300	5500 x 2400 x 3000	7000	78
CAFP 80	-45	112	74	HPO 24 / SMC 104 L					80
CAFP 80	-40	127	84	HPO 24 / SMC 104 E					79
CAFP 80	-35	144	82	HPO 24 / SMC 106 S					79
CAFP 120	-50	131	94	HPO 26 / SMC 106 S	120	350	5700 x 3200 x 3300	10000	80
CAFP 120	-45	169	110	HPO 26 / SMC 106 L					80
CAFP 120	-40	217	126	HPO 26 / SMC 106 E					80
CAFP 120	-35	264	137	HPO 26 / SMC 108 L					82
CAFP 160	-50	174	125	HPO 28 / SMC 108 S	120	350	5900 x 2900 x 3300	11000	80
CAFP 160	-45	223	147	HPO 28 / SMC 108 L					82
CAFP 160	-40	288	167	HPO 28 / SMC 108 E					82
CAFP 160	-35	363	188	HPO 28 / SMC 112 L					83
CAFP 200	-50	211	150	HPC 104 / SMC 106 E	180	350	5900 x 3100 x 3800	14000	80
CAFP 200	-45	277	177	HPC 104 / SMC 108 E					82
CAFP 200	-40	353	200	HPC 104 / SMC 112 L					82
CAFP 200	-35	415	214	HPC 104 / SMC 112 L					83
CAFP 300	-50	324	228	HPC 106 / SMC 112 L	300	800	6300 x 3200 x 3900	16000	82
CAFP 300	-45	416	263	HPC 106 / SMC 112 E					82
CAFP 300	-40	511	290	HPC 106 / SMC 116 L					83
CAFP 300	-35	599	310	HPC 106 / SMC 116 L					83
CAFP 400	-50	421	296	HPC 108 / SMC 112 E	400	800	6500 x 3700 x 4000	19000	82
CAFP 400	-45	520	332	HPC 108 / SMC 116 L					83
CAFP 400	-40	667	375	HPC 108 / SMC 116 E					83
CAFP 400	-35	793	398	HPC 108 / SMC 116 E					83

Condenser: water inlet 25°C, outlet 30°C.
Capacities are nominal, 1500 rpm at 50 Hz.
Power consumption applies to compressors only.
Refrigerant charge depends on application.

Dry weight (approx.).
Sound pressure levels measured in free field, over reflecting plane and one metre distance from the unit.

All information is subject to change without notice.